Forest Health Protection
Pacific Southwest Region

Date: December 14, 2018
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To: Marissa Jones, Klamath National Forest

Subject: Douglas-fir mortality on North Fork Ranch, Robert Will property owner

At the request of Marissa Jones (Forester) a site visit was made to the North Fork Ranch on Sawyers Bar Road (Figure 1) on December 13, 2018. The objectives were to identify and assess the current insect and disease conditions and discuss management options.

Background

Figure 1. Google Earth image of North Fork Ranch mill site with ongoing Douglas-fir mortality.

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The North Fork Ranch, owned by Robert Will, is a parcel located near the intersection of Sawyers Bar Road and Forest Road 40N51. The ranch has an active small mill site along Specimen Creek where several mature Douglas-fir have died over the past year. This mortality was not noted in the 2018 aerial survey flights. Mr. Will was concerned that mortality might continue and reduce the value of his property.

Observations

The ranch is located at the bottom of Garden Gulch with steep east and west facing slopes along the sides, bounded on the south by the North Fork Salmon River and the north by Forest Service. Specimen Creek flows through the Ranch at the mill site. The mortality seemed to be primarily in the area of the mill site where soil disturbance may have been a factor in the continued decline (Figure 2 and 3). There was discussion about a flume that he had recently piped and "wet spot" that he had recently drained. Rapid changes in water table may negatively impact tree health and vigor making them susceptible to insect pests.

Figure 2 and 3. Mill site Douglas-fir mortality occurring.

The Klamath Mountains in this area have a mosaic of dry pine/oak-dominated south-facing hillslopes and moister Douglas-fir dominated north-facing hillslopes, but historically both would have been less dense than current. High density has been associated with reduced health and vigor of forest trees especially during times of extended drought. The drought of 2010-2016 was severe for the entire state. Droughts impact forest function by reducing carbon absorption by trees which can have persistent impacts for years following drought and impact tree abilities to resist future environmental disturbances. We discussed some of the persistent effects of drought and of rapid fluctuations in the water table that can cause stress to trees. Mr. Will has been monitoring precipitation on the Ranch for about 40 years.

Robert Will had cut down some of the dead Douglas-fir to provide an easier view. After removing bark from the mid bole, flatheaded fir borer (*Phaenops drummondi*) was determined to be the cause of death (Figure 4). There was no indication of blackstain root disease and fir borer galleries at the top of the trees completely covered any evidence of other beetles that may have contributed to the demise such as Douglas-fir pole beetle (*Pseudohylesinus nebulosus*) or Douglas-fir engraver beetle (*Scolytus unispinosus*) both of which are common associates that kill the tops of mature Douglas-fir and sometimes smaller diameter trees where the bark is often thin.

Figure 4 and 5. Removing bark from sown tree revealed only evidence of flatheaded fir borer.

There was also discussion about the possibility of black stain root disease, Leptographium wageneri, and after examining several dead and dying trees the disease was not found to be a contributing factor.

Discussion

Flat headed fir borer, *Phaenops drummondi*, is one of a few species of Buprestid beetle known to attack and kill apparently healthy trees, though usually attacks trees that are injured, mistletoe-infected, or weakened by drought. Situations conducive to attacks by flat headed fir borer in Northwestern California include soil movement, shallow soil, pine/oak type habitats, alluvial floodplains during drought, wet toe slopes, and over-mature stands. Mortality is usually continuous, slow-paced, and scattered but does pick up during and after drought years.

Adult emergence begins in spring and adults feed on conifer needles prior to mating. Eggs are laid in bark crevices. Young larvae bore into the cambium and start feeding. Mature larvae move out into the outer bark in August-September and overwinter. Pupation occurs in the following spring and adults emerge. Host-finding is thought to be chemically mediated with adults attracted to certain terpenes and ethanol. Young larvae may slow growth and remain in the tree for more than a year until the radial growth has stopped. It appears to be the stop in radial growth that cues the larvae to mature and pupate.

Control of woodborers usually calls for removal of infested trees – felling, peeling, burning or prompt utilization of felled material to reduce potential damage to wood products. It was discussed with Mr. Will that he should continue to remove the dead/dying trees as soon as possible giving the best chance for residual trees to survive. Trees with live crowns that seem thin should be monitored and dealt with as needed.

If you have any questions regarding this report and/or need additional information, please contact Cynthia Snyder at 530-226-2437.

/s/ Cynthia Snyder

CC: Chris Losi, Sheri Smith, Phil Cannon, Sherry Hazlehurst, Chris Fischer